16 MAY 1914
ENTOM

Bulletin No. 194. **June, 1906.**

NORTH CAROLINA

Agricultural Experiment Station

OF THE

College of Agriculture and Mechanic Arts

RALEIGH

MULBERRIES.

THE NEW AMERICAN MULBERRY.

N. C. COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

THE NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

UNDER THE CONTROL OF THE

TRUSTEES OF THE A. AND M. COLLEGE.

S. L. PATTERSON, *ex officio* Chairman, Raleigh.

J. M. FOREHAND ..... Tyner.	A. T. MCCALLUM ..... Red Springs.
J. B. STOKES ..... Windsor.	J. P. MCRAE ..... Laurinburg.
WM. DUNN ..... Newbern.	R. L. DOUGHTON ..... Laurel Springs.
C. N. ALLEN ..... Auburn.	W. A. GRAHAM ..... Machpelah.
R. W. SCOTT ..... Melville.	A. CANNON ..... Horse Shoe.

STATION STAFF.

GEORGE T. WINSTON, L.L. D., President of the College.

B. W. KILGORE ..... Director.
W. A. WITHERS ..... Chemist.
C. W. BURKETT ..... Agriculturist.
TAIT BUTLER ..... Veterinarian.
F. L. STEVENS ..... Biologist.
H. H. HUME ..... Horticulturist.
J. S. JEFFREY ..... Poultryman.
R. S. WOGLUM ..... Acting Entomologist.
WM. KERR ..... Assistant in Field Experiments.
J. C. KENDALL ..... Assistant Dairy Husbandry.
O. L. BAGLEY ..... Assistant Chemist.
R. H. HARPER ..... Assistant Chemist.
F. C. REIMER ..... Assistant Horticulturist.
A. F. BOWEN ..... Bursar.

The Director's office is in the Agricultural Building, Raleigh: the experiment grounds and laboratories being at the Agricultural College, just west of town and on the street car line.

Visitors will be welcome at all times, and will be given every opportunity to inspect the work of the Station. Bulletins and Reports are mailed free to all residents of the State upon application.

Address all communications to

THE AGRICULTURAL EXPERIMENT STATION,
RALEIGH, N. C.

CONTENTS AND ILLUSTRATIONS.

CONTENTS.

PAGE.

Introduction 39
Propagation 39
Seed Propagation 39
Sowing the Seed 41
Propagation by Cutting 41
Propagation by Budding and Grafting 42
Stocks 43
Waxes and waxed cloth 43
Spring-budding 43
Whip grafting 44
Cleft and Saddle Grafting 45
Soils 45
Planting 46
Cultivation 46
Pruning 46
Varieties 47
Uses 59

ILLUSTRATIONS.

New American Mulberry ..... Frontispiece
Grove of Black English Mulberries 40
Cleft and Saddle Grafting 45
Black English fruit 48
Westbrook tree 50
White English fruit 51
Black Russian fruit 53
White Russian fruit 54
Native Red Mulberry 55
Hicks fruit 56
Stubbs fruit 57

MULBERRIES.

BY H. HAROLD HUME AND F. C. REIMER.

INTRODUCTION.

Probably no fruit of equal importance from many standpoints, grown in America, has received so little attention from plant improvers and planters as the mulberry. Found here and there throughout the country in fence-corners and neglected spots, in poor uncultivated soil, it is true that the mulberry has had little opportunity to show the intrinsic merits which it unquestionably possesses. It is deserving of more and better attention than it has received heretofore, though it is doubtful whether it possesses any of the essential characteristics necessary to give it standing as a market fruit. With us any fruit which is not valuable for market purposes is likely to receive scant consideration. But on the other hand we must not lose sight of the fact that the mulberry can be grown easily, that it bears fruit profusely for a long period each year, and these points, coupled with the fact that it can be put to a goodly number of domestic uses, make it particularly valuable as a home or farmyard tree.

It thrives in all parts of North Carolina, and though we are not ready to recommend its extensive planting, still we do believe that every farm home should have a small number of trees.

Within recent years some attention has been given to the subject of silk culture,* and it is hoped and believed by some that eventually something in the way of a silk industry may be developed in this country. However that may be, we must not lose sight of the fact that in the development of any such industry, the primary requisite is the presence of a sufficient number of trees of the proper sort (Morus alba) within convenient reach from which to procure the necessary leaves for feeding the silk worms.

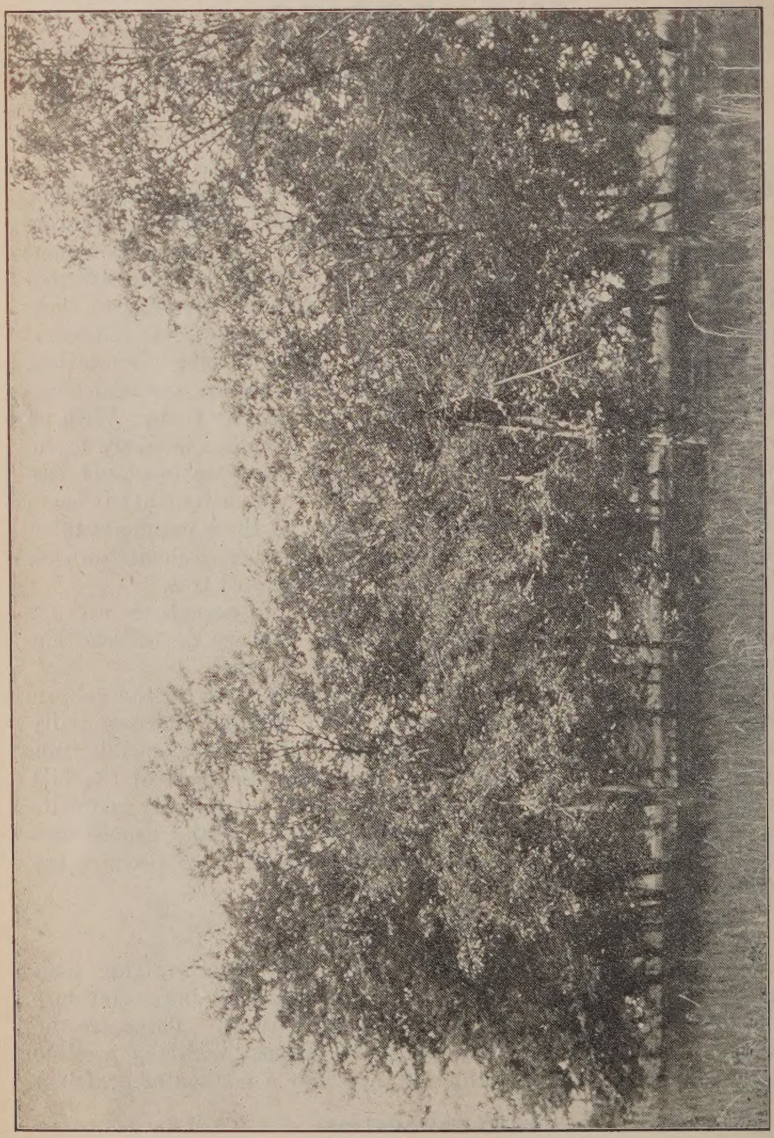
PROPAGATION.

The mulberry may be propagated from seeds or by grafting, budding, layers and cuttings. Of these methods the most important ones are by means of seeds, by grafting and by cuttings. These are the only ones which we deem it necessary to discuss, with the possible exception of sprig budding, which is in reality a method of grafting.

SEED PROPAGATION.

The mulberry can be easily propagated by seed. This method is used largely in propagating the mulberry when the tree is used for

*Those interested in this subject should procure a copy of Bulletin 181, N. C. Experiment Station, by Gerald McCarthy.



GROVE OF BLACK ENGLISH MULBERRIES, RALEIGH, N. C.

feeding silk worms in the silk industry. For this purpose the method does very well, as it is not important whether the seedling trees resemble the parent plant closely or not. Trees desired for hedges and ornamental purposes may also be grown in the same way, but when fruit is desired the best and most desirable kinds cannot be secured from seedling trees.

When gathering fruit to secure the seed, the best plan is to spread a large sheet under the tree and shake the fruit down upon it. The fruit should be mixed with a sufficient amount of water in a large tub or vat and thoroughly stirred so as to separate the seeds from the pulp. Running water should be provided if possible. Introduce the stream at one corner of the vat and allow it to flow through the box and out at the lower side, carrying with it the pulpy material as it is separated from the seed. The seed should then be dried and planted immediately or kept for future use. Seeds taken from early fruit may be planted at once. If seeds are to be held for planting the following spring, they should be thoroughly dried before storing, and kept in a cool, dry place.

Sowing the Seed.—The preparation of the land for mulberry seeds should be thorough. The ground should be well pulverized, mellow, deeply broken and sufficiently rich to give the seedlings a good start. It should contain a goodly quantity of vegetable matter to enable it to hold the necessary quantity of moisture. This needed vegetable matter may be secured by dressing the land with stable manure or by plowing under a crop of cowpeas or some other legume.

The rows should be laid off three and a half or four feet apart. Sow the seed thinly about two or two and a half inches deep. This work may be done by hand or a garden seed-drill may be used for the purpose.

In North Carolina, generally speaking, the seed may be sown between the latter part of March and the latter part of May. Seed that has been held over from the previous season will not germinate so rapidly as the newly-extracted seed, and for this reason should be planted as early as possible. Taking the State as a whole, the best date would be about April 15th. Seed freshly extracted cannot be secured until the middle of May, but may be sown then with good results, provided the weather conditons are right.

PROPAGATION BY CUTTINGS.

Most species of mulberries are easily propagated by means of cuttings. And while the most satisfactory and most economical plan is to use one-year-old branches for this work, twigs of the current season's growth may also be used.

Cutting wood may be removed from the trees soon after the leaves have dropped. Select well-matured, well-developed one-year-old

branches from one quarter to five-eighths inches in diameter. Cut these into pieces, each being provided with from three to six good buds. The length of the pieces will vary somewhat, from eight to ten inches is about right, but before planting it is best to divide them into bunches, each bunch being composed of those of nearly equal length. The upper cut should be made a half inch above a bud, and a very sharp knife should be used to insure a perfectly smooth cut. Smooth cuts will callus over much more rapidly than ragged ones. Before planting, it is sometimes desirable to split the lower ends of the cuttings an inch or two and spread them slightly, thus giving a larger surface to callus over. This often results in a much stronger root system and consequently more vigorous growth during the season.

In eastern North Carolina the cuttings may be planted immediately after removal from the trees; but in the colder sections it is usually best to tie them together in bunches of twenty-five and store them in damp sand in a cellar or pit until spring. The bundles should be entirely buried, and by spring it will be found that the wounds have callused, and in some cases tiny roots will have started. A good plan for storing is to pack them on end in sand, covering them about half way up and then covering over the tops with damp sphagnum moss.

The ground in which the cuttings are to be set should be well plowed and pulverized thoroughly, then rolled. The earth, if in good mechanical condition, may be opened for the cuttings by simply thrusting a spade down into it, along the line from one end of the area to the other, at each thrust shoving the spade a little to one side to make an opening. Into the opening thus made thrust the lower ends of the cuttings, leaving only one bud above the surface, and pack the earth tightly back in place with the feet. Or, a furrow may be thrown out with a plow and the cuttings covered up to the top bud by plowing a second furrow back against them, packing the earth against them as already indicated. Planting should be followed with a cultivation with a light cultivator to provide a surface mulch of dry earth.

PROPAGATION BY BUDDING AND GRAFTING.

Mulberry trees cannot be propagated as cheaply by budding and grafting as by seeds and cuttings, but seeds will not give trees like those from which the seed was gathered, and cuttings will not make large-sized trees quickly enough in many cases. Hence, to get good-sized trees in a comparatively short time and of known parentage, budding or grafting must be done. The common methods used in propagating the mulberry are sprig or scion-budding and whip, cleft and saddle-grafting. All the methods of grafting mentioned may be

used indoors, *i. e.*, bench-grafting; while the first two, viz., whip and cleft-grafting, are the only ones which can be conveniently used for outdoor work.

STOCKS.

In the North and West, Russian mulberry seedlings are used for stocks, while by many Southern nurserymen *Multicaulis* mulberry stem or root cuttings are used almost entirely. Whether Russian mulberry seedlings would or would not be superior to *Multicaulis* cuttings or seedlings, we are unable to say, as experimental knowledge is lacking on this point; but in the longer-growing season of the South it is a fact that in some parts the trees, even when grown on root cuttings, reach such a size in a single season as to make them unsalable. Under such conditions they should be grown only from cuttings.

WAXES AND WAXED CLOTH.

Grafting Wax.—Good grafting wax may be made from resin, beeswax and tallow or linseed oil. A large number of formulas have been used, but the following are good and may be taken as representative:

1. Resin, 6 pounds; beeswax, 2 pounds; linseed oil, 1 pint.
2. Resin, 4 pounds; beeswax, 2 pounds; tallow, 1 pound.

Melt the ingredients of either formula in an iron kettle over a slow fire. Stir as they melt, to insure thorough mixing. Pour out into a bucket of cold water, grease the hands and pull until it becomes straw-colored. Wax not intended for immediate use may be rolled up in greased paper and put away. Grease the hands a little in using the wax.

Waxed Cloth.—Melt a sufficient amount of the wax in a kettle. Into it dip narrow sheets of old calico or cambric. As soon as saturated with the wax take them out, stretch and allow to cool. For use tear into strips about one-half inch wide.

Waxed Twine.—Melt the wax as above, and into it drop balls of No. 18 knitting cotton. Stir them about in the wax for about five minutes, by which time the wax will have penetrated them. Then take them out and allow them to cool. The twine will break easily without injuring the fingers.

SPRIG BUDDING.

This method may be used in propagating the mulberry. It was probably first extensively used by S. D. Willard, Geneva, N. Y.

The scions should be cut in autumn as in the making of cuttings, and held over until time for inserting in spring after the leaves have

started, and the bark separates readily from the wood. Use small-sized, well-matured shoots with two or three well-developed buds. Prepare the scions for inserting in the stocks by making a smooth, sloping cut on the lower end. This cut should be an inch or an inch and a quarter in length.

The stock is prepared for the scion as in ordinary shield-budding by making two cuts in the shape of the letter T on its side, close to the ground where the scion is to be inserted. Carefully lift the edge back and insert the scion, shoving it well down into place. Then wrap with waxed cloth or twine and cover the point of union with grafting wax.

In from ten days to two weeks the parts will have united, provided the operation is successful. At this time the stock should be lopped or its top should be cut back to divert a larger portion of the sap to the scion, thus forcing it into growth.

WHIP GRAFTING.

For this work either a whole seedling root or a piece of a root may be used as a stock. On account of the spongy nature of the mulberry root it is best to use the whole root, making the insertion at or in the solid part of the stem just at the ground. In the warmer parts of the State the stocks may be taken from the ground as desired for use, but in the colder sections, where the ground is more or less frozen during winter, they should be lifted in autumn after they have become dormant and stored until needed in February and March. The scions should be procured about the same time and carefully stored.

In preparing the stock cut off the tops and at the crown or on the root at the desired point, as the case may be, make a sloping cut one and a quarter inches long. On the scion (cut to a length of six or eight inches with a bud within a half inch of the upper end) make a corresponding oblique cut. On both stock and scion raise a tongue of wood and then shove the two pieces together, taking care that the cambium layers along one side at least are in contact. Then wrap with waxed cloth.

In eastern North Carolina these may be planted out immediately, but in the western sections it is best to tie them in bundles of twenty-five, and store as directed for cuttings, until time for planting arrives.

CLEFT AND SADDLE GRAFTING.

Both these methods are well adapted for the propagation of the mulberry, and may be used either for whole stocks or for piece roots, or stem-cuttings.

The scions and stocks should be procured in late autumn and stored until February, as directed under whip grafting.

Cut the scions six or eight inches in length. For cleft grafting, trim the lower ends to a wedge, with sloping cuts one inch in length, and for saddle grafting split the scions one inch up from the lower end.

Prepare the stocks for cleft grafting by splitting them down one inch, and for saddle grafting by trimming to a wedge to fit the split ends of the scions. In both methods place the stocks and scions together with the cambium layers in contact, wrap and treat as directed under whip grafting.

SADDLE GRAFT.
(From author's Bulletin for January, 1906.)

CLEFT GRAFT.
(From author's Bulletin of Department of Agriculture, January, 1906.)

SOILS.

No tree will thrive on a greater variety of soils than the mulberry. In fact, it seems to be indifferent as to the kind of soil. In North Carolina it can be grown successfully on the sandy soils of the coast

region, the sand hill section, the heavy clays of the Piedmont, and the clays and rocky soils of the mountains. The soil need not be rich, must not be too wet, but should be rather moist. It flourishes best on the moist, sandy loams of the eastern part of the State.

PLANTING.

The planting can be done either in fall or spring. In Western North Carolina the best time for planting is during the month of March, while in the eastern sections late November to January is probably the best season. The distance apart should be varied for the different kinds. Large trees—like New American, White English and Black English—should be planted not less than thirty feet apart; and those belonging to the American species (*M. rubra*)—like Stubbs and Hicks, should be planted thirty-five feet apart. The varieties belonging to the Russian group are usually smaller and need not be planted more than from twenty to thirty feet apart.

The planting does not require any special skill or care. The trees will usually live even under the most adverse conditions. Dig the hole large enough to receive the roots, and deep enough so that the tree will stand slightly deeper than it did in the nursery row. As nursery trees are usually large they should be heavily cut back; say to a height of three feet. The long roots are much broken in digging the trees, and should be well trimmed before setting.

CULTIVATION.

The mulberry needs little or no cultivation. When planted in chicken yards or where hogs are allowed to run and root, no extra cultivation need be given. They will thrive in soddy land; but generally the trees do better where the soil is stirred or worked, as in hog pastures. If any cultivation is given it should be shallow, as the roots spread out near the surface of the ground. Deep plowing should not be practiced.

PRUNING.

The mulberry requires little or no pruning. But as the wood is rather brittle and the branches are easily broken by sleet storms, the stubs which are left should be cut off close up to the trunk and the broken branches cut smoothly off at the ends; all large wounds should be covered with paint. The Black English variety has a tendency to grow tall and upright; this can be overcome by cutting it back while the tree is young. Some varieties form very thick heads, which could be thinned out to advantage. Long roots should be cut back when planting.

VARIETIES.

The number of varieties of mulberries brought forward is not large. Of these a number have been added quite recently, and it is very probable that the list will be increased from year to year. Most of these are seedlings which have attracted attention in different regions because of merits which they possess. Undoubtedly there are many varieties in the country not now advertised or propagated by nurserymen which are equal or superior to many of our named varieties. This is but a natural result of the planting of a large number of seedling trees.

The nomenclature of the mulberries is badly mixed, and it is impossible to trace some of the varieties back to their origin.

We have endeavored to classify all the varieties now catalogued or grown in the South, according to the species from which they have been derived. This system of classification was first used by Professor L. H. Bailey.

In one or two instances it has been very difficult to say in which group a certain variety belongs. In some instances they appear to grade into each other in such a way as to suggest a hybrid origin. This is particularly true of the Black English now grown in North Carolina. We have placed it in the Morus alba group, but it shows some characteristics of our native mulberry Morus rubra, and it is in all probability a cross between the two species just named.

In planting mulberries for fruit in this State the following varieties should be given preference:

Black-fruited: New American, Black English, Stubbs and Townsend. White-fruited: White English and White Russian.

The New American is a large-fruited, prolific variety. The fruit is sub-acid and of excellent quality.

Black English is a strong upright grower, which bears a large amount of fruit of medium size for a long period. This is one of the most satisfactory varieties catalogued by North Carolina nurserymen.

Stubbs. This is a wide-spreading, vigorous, large-fruited and prolific variety. The fruit is strongly sub-acid, and the largest variety known to the writers.

Townsend. This is probably the earliest fruiting variety now grown. While it has not been grown in this State, we believe that it should be introduced. It would lengthen the mulberry season considerably.

White English. It is a very heavy bearer, producing sweet, medium-sized fruit for many weeks. This is by far the best white-fruited mulberry that we have seen.

BLACK ENGLISH (ONE-HALF SIZE).

DESCRIPTION OF VARIETIES.

Varieties Derived from *Morus alba.*

This species is probably a native of China, and has been cultivated for centuries in the Old World for feeding silk worms. It was introduced into this country early in the last century and now is often found wild throughout a large portion of the eastern part of the United States.

The tree is a large, vigorous, upright grower, with medium-sized, ovate or oblong leaves which have a smooth, shiny surface and are light green in color. The teeth on the margin are usually large and rounded.

The fruit of the original form of this species is white or violet; but a number of black-fruited varieties have also been produced.

Black English. Fruit—Form oblong, slightly curved; medium to large, ¾ x ⅜ to ¾ x ½ inch; reddish, becoming black when fully ripe; apex rounded; base oblique and irregular; stem ½ inch long, slender; druplets variable, flat to circular in outline, compacted and firm; sutures rather shallow and narrow, flavor sweetish; quality only fair. Season, May to July.

Leaves—Ovate to oblong elliptical, regular; apex long acuminate; base rounded or slightly cordate or nearly truncate; leaves on young growth four to five lobed, sinuses deep and rounded; size variable, average 3¼ x 2½ inches; surface smooth above, rough beneath, finely pubescent along the veins; color dull green above and light green below; margin regular, strongly serrate, sometimes serrate dentate; petiole 1 to 1½ inches, stout, veins prominent, white; pubescence well marked on veins and very fine over entire under surface.

Tree—Large, vigorous grower; strongly upright in habit, branches with a stripped habit; heavy and continuous bearer. Much grown in North Carolina. Specimens obtained from J. Van Lindley, Pomona, N. C.

New American. Fruit—Form oblong, slightly curved and somewhat irregular in large specimens. Size, very large—1½ x ½ to 1¾ x 8-16 inch; color, shining black when ripe; apex blunt and rounded; base oblique and irregular; stem stout and short, ⅜ inch; druplets medium in size, flattened, irregular, compact, smooth; sutures rather shallow and narrow; flavor very sweet; quality good. Season, May to July.

Leaves—Ovate to oblong, often somewhat rhombic on young growth. The leaves are two to four lobed, sinuses rather shallow and acute; apex long acuminate; base truncate; size 2 x 1½ to 4¼ x 2½ inches; thick, leathery, smooth upper surface, lower surface slightly rough; color dark green, shiny; margin serrate dentate, teeth rounded; veins prominent, whitish, no pubescence.

Tree—A large, vigorous, hardy tree. A heavy and continuous bearer. Introduced about 1854 by N. H. Lindley, of Bridgeport, Conn. Very widely grown and considered the best variety now in cultivation. Specimens received from J. Van Lindley, Pomona, N. C. Especially adapted to the cold mountain climate.

Westbrook (Westbrook Choice) (*Black English*). Fruit—Form oblong, slightly curved; size medium—$\frac{3}{4}$ x 5-16 to 13-16 x $\frac{3}{8}$ inch; color reddish, becoming black; apex rounded; base oblique; stem short, 5-16 to $\frac{3}{8}$ inch, slender; druplets variable, oblong to roundish in outline, loosely compacted; sutures of medium depth and rather narrow; flavor sweet, pleasant; quality good. Season, May to July.

Leaves—Shape oblong, pointed; apex long acuminate, base truncate or slightly cordate; rather small—$1\frac{1}{2}$ x $1\frac{1}{2}$ to 4 x 2 inches; aver-

WESTBROOK (BLACK ENGLISH).

age 3 x 2 inches; character thin, smooth above, slightly rough beneath; pubescent on larger veins; color shining, light green above, light yellowish green beneath; margin serrate, well marked, regular; petiole short, $\frac{3}{4}$ inch, medium stout; veins prominent, whitish, pubescent on large veins.

Tree—Of medium size and vigor, heavy fruiter. This is simply a selected strain of Black English. A good variety for poultry and swine. Much like Black English. Specimens obtained from J. Van Lindley, Pomona, N. C.

White English. Fruit—Form oblong, curved; size medium—$\frac{5}{8}$ x $\frac{3}{8}$ to 13-16 x 7-16 inch; color whitish, turning brownish as it becomes over-ripe; apex rounded, base rounded or oblique; stem long, $\frac{1}{2}$ to $\frac{5}{8}$ inch, slender, curved; druplets flattened, narrow, compacted, medium in size; styles very prominent on ripe fruit; sutures narrow and fairly deep; flavor sweet; of good quality. Season, May to July.

WHITE ENGLISH.

Leaves—Oblong, elliptical, some leaves nearly rhombic, young leaves two to five lobed, sinuses shallow and rounded; apex with long acuminate point; base slightly cordate; average size $3\frac{1}{2}$ x 2 inches; medium, thick, upper surface smooth, lower surface smooth and somewhat pubescent; upper surface dark green; lower surface yellowish green; margin strongly serrate, dentate; petiole short, slightly curved; veins very prominent on lower side, whitish; pubescent only in the axils of veins.

Tree—With a distinct spreading, sprawling habit. Very vigorous. Bark on larger branches with distinct brownish, irregular, cracked streaks. The fruit is very sweet and pleasant. Specimens for description obtained from J. Van Lindley, Pomona, N. C.

Varieties Derived from *Morus alba var Tartarica.*

This is a sub-species of the White Mulberry group. It was introduced into the West by Russian Mennonites about 1875, and has

proved itself well adapted to that rigorous climate; it is undoubtedly our hardiest mulberry. As it is usually propagated from seed, it is very variable.

The tree is small and bushy, usually with a drooping habit. It is much used as a stock where extreme hardiness is necessary. The fruit, like that of its parent, the White Mulberry, is variable in color and size. Most varieties of it are white or violet in color and more rounded in form than those of other species. Some forms of it are much used for ornamental purposes.

Abundance. Same as Barnes.

Barnes. Fruit—Cylindrical, somewhat curved; size medium—$\frac{3}{4}$ x $\frac{3}{8}$ to 1 x $\frac{1}{2}$ inch; color black, when fully ripe; apex rounded; base irregular and oblique; druplets large, ovate to roundish in outline, compact; styles present but not conspicuous; sutures shallow and narrow; stem short and thin, and deeply imbedded; flavor slightly sub-acid, but very sweet when fully ripe; quality fair. Season, May and June.

Leaves—Ovate to oblong ovate; apex rounded or sometimes acute; base truncate, often oblique; size medium—$2\frac{1}{2}$ x $1\frac{3}{4}$ inches; thin and smooth; dark green in color; margin serrate-dentate; veins distinct but not prominent.

This variety was introduced about ten years ago by John Frasier, of Huntsville, Ala., who secured it from a neighbor as a Russian seedling. It has also been advertised recently under the name "Abundance."

Black Russian (*Russian*). Fruit—Short oval to oblong; size medium—$\frac{3}{4}$ x $\frac{1}{2}$ to 1 x $\frac{1}{2}$ inches; black when ripe; apex blunt, obtuse; base oblique, somewhat irregular; stem short, small—$\frac{1}{4}$ to $\frac{3}{8}$ inch long; druplets large, broad and rounded, irregular, rather compact; sutures deep and open; flavor sweet, slightly sub-acid; quality good. Season, May to June.

Leaves—Ovate, often oblong-ovate; size medium—$3\frac{1}{4}$ x 2 to $4\frac{1}{2}$ x 3 inches; thin, leathery, smooth above, rough below; dark green in color; margin irregular, singly or doubly dentate-serrate, teeth large and rounded; young leaves strongly lobed; veins prominent, whitish; and rounded; young leaves strongly lobed; veins prominent, whitish; pubescent along veins on under side.

Tree—Small, rapid grower, hardy. Early and heavy bearer. One of the many Russian seedlings. Obtained from John Young, Greensboro, N. C.

The three following varieties are not grown in the State so far as we know, and have not been seen by the writers. We do not know what class the Monark belongs to, but have placed it here because

BLACK RUSSIAN.

it originated in that part of the West from which most of our Russian varieties have come.

Monarch. This is a white-fruited variety, advertised by Stark Bros., Louisiana, Mo., who secured it from Mr. E. H. Riehl, of North Alton, Ill. A chance seedling which came up at Mr. Riehl's place about forty years ago. It is said to be a very vigorous grower. The original tree is said to be over 60 feet high, with trunk over nine feet in diameter.

Munson. Originated by T. V. Munson, of Denison, Texas, from a seedling of the Russian. Said to be one of the best Russians.

Ramsey. A white-fruited mulberry of Russian parentage. Not highly prized. Introduced about 1880 by Ramsey & Son, of Mohamet, Texas.

Victoria. Fruit oblong or cylindrical; size small—7-10 x $\frac{3}{8}$ inch; color black; base and apex rounded; druplets usually flattened, oblong, medium in size; sutures shallow and narrow; flavor sweet, insipid; of poor quality. Season, May to June.

Leaves—Ovate, lopsided; small—2 x $1\frac{1}{2}$ inches; margin with large rounded teeth; surface smooth; thin blade; color dark green. Specimens for description obtained from G. Onderdonk, Nursery, Texas. Introduced by G. Onderdonk in 1883. Said to be one of the best varieties in Texas.

WHITE RUSSIAN.

White Russian. Fruit—Form variable, from oval to oblong, plump; medium in size—$\frac{3}{4}$ x $\frac{5}{8}$ inch; color white, and ends of druplets purplish, becoming deep purple when over-ripe; base and apex rounded and regular; stem medium, stout and long, 7-16 inch, curved; druplets large oval or roundish in shape, loosely compacted; sutures deep and open; flavor very sweet and rather flat; quality fair. Season, May to June.

Leaves—Ovate to oblong, usually lopsided, leaves on young growth

deeply three to five-lobed; apex short—obtuse or rounded; base obliquely truncate; blade rather small—$1\frac{1}{2}$ x $1\frac{3}{8}$ to $3\frac{1}{2}$ x $2\frac{1}{2}$ inches; color dark green on upper side, yellowish green on lower side; thin, smooth on both sides; margin prominently serrate-dentate, teeth strongly rounded; and short; petiole $1\frac{1}{2}$ to $2\frac{1}{4}$ inches, stout, curved; veins very prominent on under side; whitish yellow in color; tufts of pubescence in axils of veins on lower side.

Tree—Small, bushy and very hardy; quite productive. One of the Russian seedlings from Kansas. Will probably become a desirable new variety. Specimens obtained from J. Van Lindley, Pomona, N. C.

NATIVE RED MULBERRY.

Varieties Derived from *Morus rubra*.

This species is a native of this country, and is very widely distributed, being abundant from the extreme north to the Gulf of Mexico. It is a very hardy and vigorous tree, and from it several important varieties have sprung.

Its leaves are large and rough, and those on vigorous shoots are usually much-lobed. The fruit varies considerably, but usually is reddish or black in color and of good, sub-acid flavor. On the wild forms the fruit is usually of medium size, but some of the varieties which have sprung from it have very large fruit of good quality.

HICKS.

Hicks. Fruit—oblong, straight or curved; medium to large in size—$\frac{3}{4}$ x $\frac{1}{2}$ to $1\frac{1}{4}$ x $\frac{1}{2}$ inch; color reddish, becoming black; apex rounded, base oblique or rounded; druplets compacted, flattened, medium; styles inconspicuous; sutures narrow and shallow; stem $\frac{1}{2}$ inch long, slender, deeply imbedded in fruit, pubescent; flavor sweetish, insipid; ;quality poor. Season, June to July.

Leaves—Ovate, apex variable, rounded and blunt to long acuminate, often-lobed; leaves on young growth deeply four to six-lobed, with deep and rounded sinuses; base truncate or rounded and cordate; very large—3 x 4 to 6 x $4\frac{1}{2}$ inches; blade thin, rough, thickly pubescent beneath; dull green in color, lighter green beneath; margin strongly serrate, teeth large; veins large and prominent; light yellowish, white beneath; pubescent beneath, especially on the veins.

Tree—Large, vigorous grower; very heavy, continuous bearer. Originated at Macon, Ga. Introduced about 1850 by Simri Rose. Good for swine and poultry; too poor flavor for eating purposes. Obtained from G. L. Taber, Glen St. Mary, Fla., and J. Van Lindley, Pomona, N. C.

STUBBS.

Stubbs. Fruit—Form oblong, curved and slightly irregular; very large—$1\frac{1}{2}$ x $\frac{1}{2}$ to 2 x $\frac{5}{8}$ inches; color bright, deep red, becoming black; apex rounded, base usually oblique and somewhat irregular; druplets compacted, flattened, medium in size; syles present; sutures shallow and narrow; flavor sub-acid; vinous, sharp; quality good. Season, June to August.

Leaves—Ovate, somewhat variable, often two to three-lobed, sinuses deep and narrow, apex abrupt; base truncate or oblique; size 4 x 3 inches, thick, smooth above, rough beneath; dark green color; margin irregular, often broken, teeth variable, large, singly or doubly serrate. Veins very prominent, white; pubescent on under side.

Tree—Very large and vigorous; very prolific. Originated near Duplin, Ga. Mr. P. J. Berckmans introduced it about 1887. Specimens from G. L. Taber, Glen St. Mary, Fla.

Townsend. Size medium—1 inch by ½ inch; oblong, slightly curved; black; rounded at both base and apex; druplets long and narrow, 3-16 by 1-16, not permanent; sutures rather shallow; flavor sweetish, not differing from other mulberries. Season early; ripening at Glen St. Mary during the latter part of March and the month of April.

Leaves—Ovate in shape; apex short, with short acuminate point; base cordate, often unequal; size medium to large—4½ x 3 to 5½ x 4 inches; surface even, slightly rough; lower surface rather smooth; color shining dark yellowish green; margin regular, sharply serrate; veins prominent, whitish; pubescence only along the veins; petiole stout, 1 to 1¼ inches long.

Prolific trees fruiting abundantly in the nursery row one year from grafting. Original scions obtained by Mr. G. L. Taber from Mr. Andrew Townsend, Glen St. Mary, Fla., in 1903.

The fact that this mulberry ripens so much ahead of other varieties in North Florida, a characteristic which it will retain, doubtless, in other parts, should give this fruit a prominent place among the varieties of this fruit.

Varieties Derived from *Morus latifolia.*

This was the most important species during the silk industry craze of 1830-'39. It is a native of China, and was introduced into America from France about 1826. It is a vigorous grower, but never attains a very large size. The leaves are very large, rough, and dull in color. The fruit is black and sweet. This species has given rise to one important variety—the Downing—which has practically disappeared from cultivation. It has been supplanted by the New American, which is a much better variety; this latter variety is often sold under the name Downing. This species is used almost entirely in the South as a stock for the other species of mulberries.

The Black Mulberry (*Morus nigra, Linn*). This is the species cultivated in Europe for its fruit. It is almost unknown in this country at the present time. About fifteen years ago the Black Persian, a variety belonging to this species, was cultivated in parts of the South; but at present no nurseryman in the South catalogues it, so far as we know. The P. J. Berckmans Company, of Augusta,

Ga., writes us as follows, regarding this variety: "We used to cultivate the Black Persian Mulberry years ago, but we have lost it. It makes a very dwarf growth, and is unsatisfactory here."

USES.

The mulberry has not been put to many uses, and has not been as extensively used as its merits indicate. The fruit of the best varieties is very good when eaten fresh. Some of the varieties ripen their fruit over a period of several months, which is not true of any other fruit. It can also be used for pies, and jellies, and those who have used them say that they are quite good.

The tree is a rapid grower and makes a splendid shade tree, especially around stables and stock yards.

No better fruit is known for swine and chickens than the mulberry. Some trees produce as high as ten or twelve bushels of fruit, and during the long fruiting period, pigs and chickens need little other food. They also grow well in hog pastures and chicken yards, and give excellent shade.

They serve an excellent purpose near cherry trees and on strawberry plantations in attracting birds away from these fruits. As long as there are ripe mulberries close at hand, the other fruit will suffer very little from birds.